CRATERS OF THE MOON NATIONAL MONUMENT AND PRESERVE DEER SURVEY AND OBSERVATIONS 2008

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Executive Summary

Mule deer surveys were performed during the spring and late summer of 2008. These included unstructured spring surveys as well as the systematic fall surveys in the north end of the monument. Systematic road surveys were continued on the loop road in addition to the usual informal count during May and June.

The number of does continued to decline from the previous three year period. Numbers were about a third of the 15 year average. Observations of yearlings crashed with numbers about ten percent of the 15 year average. Over-winter survival of fawns was not calculated and reported due a very small and statistically skewed sample size.

The fall survey recorded numbers that were half or less of the 15 year average for all age classes. The fawn to adult female ratio increased slightly to reach a 3 year high. This may indicates a slight increase in birth rates or an increase in early fawn survival. The total population estimate also showed a similar decrease and was less than half of the 15 year average. This was likely influenced by drought conditions continuing through most of the last five years.

When the data was averaged into three year intervals the deer population shows a general pattern of decline since the mid 1980s and reaching its lowest point in the current period. The numbers of all age/sex classes have continued a decline started in 2000.

The moose population in Little Cottonwood continues to remain stable with one pair of adults and one or two calves in a season.

The Idaho Department of Fish and Game has been augmenting elk herds in the vicinity of Bear Trap cave in the BLM portion of the monument. Although releases were completed in 2006 this herd has continued to expand with numerous sightings in the Preserve.

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Introduction

Monitoring of the mule deer population began in 1980 when Griffith initiated a study on the population dynamics and habitat use of the monument's deer herd (Griffith, B. 1983. Ecological characteristics of mule deer: Craters of the Moon National Monument, Idaho. Report B-83 2. Coop. Park Studies Unit. Univ. of Idaho, Moscow 109 pp.). As a result of this study Griffith developed site specific Standard Operating Procedures (SOP) for the continued monitoring of the deer population using an annual spring and late summer deer survey. These surveys were first performed in 1984 and have been conducted each year since.

Moose were first documented in Little Cottonwood Creek in June of 1999. Observations since that time suggest that a breeding population has been established and is persisting. Observations were recorded of moose and entered in to the wildlife observations database.

Prior to 2004 elk were considered to be very rare in the Monument and Preserve area southwest of Hwy 20/26. The Idaho Fish and Game Commission has closed the hunting season in this area since the 1940s. From 2004 to 2006 the Idaho Department of Fish and Game transplanted numerous elk into the portion of the monument managed by the Bureau of Land Management (BLM). This herd has continued to expand and reoccupy former elk range in the Preserve. As this happens it is of interest which areas of the Preserve are being colonized.

Methods

The spring survey is in informal survey conducted from late April until 30 June. During this period the monument staff was requested to record any mule deer sighted. Most of these observations were made while in the field conducting other duties such as ranger patrols or other wildlife monitoring. Deer sighted were classified as adult males, adult females, yearlings and unknown. Starting in the spring of 1998 systematic road surveys were conducted in addition to the usual informal survey. The spring road surveys were conducted on the loop road starting at the Visitor Center and ending at the end of the one way section of the loop road. The route used included the spur road to the tree molds parking area but did not include the road to Devil's Orchard trailhead.

Late summer and early fall surveys were conducted from a vehicle along the 3.9 mile section of secondary road that runs from the North End gate off Highway 26 to the old Martin Mine site in the north end of the monument (appendix 2). Observations began at sunrise and were made in one direction only. Survey days were evenly distributed over the four week period, avoiding mornings with rain or winds greater than 10 mph. As with the spring surveys, all sightings were classified according to sex and age (adult, yearling, fawn). Surrounding hillsides, lava flows, and valleys along the route were carefully observed with the use of binoculars and a spotting scope. All surveys took approximately two hours to complete. Eight surveys were completed during the period from August 19 to September 23.

Over-winter survival rates were determined using the spring and previous year's late summer survey data. In order to get more normally distributed data for analysis the highest and lowest counts were dropped leaving the 6 middle surveys for statistical analysis. Population means, ratios and percent change estimates were calculated for all age/sex classes. Population estimates and 95% confidence intervals were calculated using data from the six late summer surveys. Standard error estimates for each age and sex class in the late summer survey were calculated and 95% confidence intervals established using the student t-test. For the equations used to calculate these parameters see the Craters of the Moon Mule Deer Survey Standard

Operating Procedures (SOP) (file; CRMO deer SOP 2007.doc).

For moose and elk incidental observations are recorded primarily in the course of other work in the areas of interest.

Results

SPRING SURVEY

The number of adult does observed in the spring surveys was 20 (table 1). The number of yearlings was 3. Over-winter fawn survival is not reported. The protocol for this survey requires a minimum spring count of 100 animals and states that 200 or more animals is preferable. The total for 2008 was 23. 2002 was the first year since this survey began in 1984 that the population statistics were not calculated due to a too small sample size. Spring observations have continued to decline since that year.

FALL SURVEY

The mean number of deer in every sex/age classes showed a decrease from the 2007 count (Table 1). Adult females showed an annual mean of 6.5 which was a 26% decrease from 2007 (fig 1). It is also well below the 15 year average of 19 and slightly below the average of 7.4 for the previous 3 years.

Fawns showed a similar decrease with a mean of 5.8 or 13% decrease from 2007 (fig 1). This compared to an average of 5.4 for the previous 3 years and 15 year average of 28. The total number of deer observed also showed a decrease with a mean of 13.3. This compares to a mean of 15 for the previous 3 years and 15 year average of 39.

The total population estimate was 116$\pm$45 based on the fall counts. This is the lowest population size since monitoring was started in 1984.

MOOSE

Several individual observations of moose were recorded during 2008 thru Oct 1. These observations included a minimum population of 5 animals. A minimum of 1 adult male, 1 yearling male, one female, and a calf were observed in the Leech Creek/Little Cottonwood drainage during 2008. In addition to the animals regularly seen in the Leech and Little Cottonwood Creeks, one yearling was observed in the Preserve near the Blizzard mountain County road.

ELK

No elk surveys are performed at CRMO but animals are regularly seen in the course of other tasks. In addition to regular sightings in the Little Cottonwood/Leech Creek area; several sightings of elk, tracks and pellets were recorded in the Preserve. Elk were found using kipukas and on the Wapi, Kings Bowl, Minidoka, Larkspur Park, Kimama, and Bottleneck Lake lava flows. The origin of these elk in the southern half of the Preserve is thought to be the IDFG stocking program in the BLM monument. Elk were also seen on and near the Carey Flow. Carey Flow sightings ranged from the southern terminus of the flow southeast of Carey to the area northeast of Lava Lake. Sightings ranged from the southern edge of the Wapi Flow north to the area

around Huddle's Hole. Elk or sign were also seen on Laidlaw Park and on the southern edge of the Carey Flow. The Idaho Department of Fish and Game flew transects in the Pioneer Mountains in and adjacent to the CRMO and recorded 245 elk wintering in the area during February 2008. Elk seen in the highway corridor and in the Little Cottonwood/Leech Creek area are likely a portion of this herd.

Conclusions

During the 2008 surveys the sample size in the spring surveys were the smallest yet recorded. The protocol for this survey requires a minimum spring count of 100 animals and states that 200 or more animals are preferable. Smaller samples than this will have a lot of statistical variability and many normal statistical procedures are not valid. For example the over-winter survival of fawns was clearly affected by the small sample size. When the normal calculations were tested the over-winter survival was calculated to be over 100% in some years while dropping to near 50 in other years (figure 3). Since survival greater than 100% is not possible this test was able to verify the need for larger sample sizes to accurately calculate population parameters.

Continuing the pattern of 5 years of decline, the fall deer counts showed a decrease in every age class from 2007. Although, none of the individual declines were significant at $p<0.05$, it is significant that all age classes showed the same pattern of decline.

Table 3 shows survey and population statistics in 3 year intervals since surveys began in 1984. Several trends are observable in this data. One is declining numbers of does and fawns in the fall survey since the mid 1980s. These data show that the counts of these two age classes are about one third of what they were in the mid 1980s for does and about one quarter for fawns. The most recent period (2005 to 2007) showed the lowest average count of both fawns and adult females. These declines are likely a result of climate and other factors discussed below.

Unlike females and fawns, male deer (both adults and yearlings) have always had comparatively low counts and they have not showed any consistent trends in their year to year numbers. This lack of trends is true both for spring (figure 2) and fall counts (figure 1). This accounts for large percentage fluctuations not having much significance. For example, an increase of 213% from 2003 to 2004 was less than half an animal per survey.

The total population estimates follow the declining trend as the doe counts. That is declining numbers throughout the 1980s and 1990s with numbers leveling off or increasing follow wet years (figure 4). This was followed by a steady decline starting in 2000 and continuing through 2008. This trend was likely influenced by the occurrence of frequent drought years from the mid 1980s through the present (figure 5).

The continuing pattern of decline is likely related to the drought conditions that predominated over the past 25 years. The water year (October thru September) recorded 12.48 inches of precipitation. While this was 81% of the 50 year average, it came in an unusual distribution. The first half of the winter (Dec-Feb) was well above average. The summer season of June thru August was the driest on record. The average precipitation from the period June 15 to September 15 is 2.74 inches. The same period in 2008 saw only 0.21 inches of rain. This unseasonably dry summer resulted in a premature drying of forage vegetation. The lack of both water and forage in late summer likely had an effect on deer distribution although to what degree is still unknown.

A comparison of figures 4 and 5 show that the when the annual rainfall increased the total deer population also increased. The deer population has shown a more consistent trend of decrease. This may indicate that as the deer population continues to decrease it becomes less able to rebound following a one year increase in rain fall. The 25 year average annual precipitation is 10% below the 50 year average and that 60% of the last 25 years are below even that level. The area appears to be in a prolonged drought period with only occasional average and above average years. This is consistent with national and regional data. The National Weather Service Western Regional Climate Center's database (http://www.wrcc.dri.edu/CLIMATEDATA.html, accessed 10/20/2008) shows that the last 25 years of the century (1901-2000) was the driest of any quarter for most reporting sites in the western third of the United States. This would suggest that the deer populations may continue to decline or at best may stabilize at some undetermined low point. If climate change continues unchecked, many climate models predict an increase in the severity and frequency of drought periods in the intermountain west. If this situation develops the trend discussed above may only worsen and mule could become imperiled in the monument and preserve.

MOOSE

A park employee reported a moose calf in June. In late August a yearling were seen next to the Blizzard Mountain county road approximately 3 miles northeast of the Little Cottonwood drainage. With a calf observed and a yearling leaving indicates the small breeding population at Craters has remained stable. Only time and additional years of observation will determine if this population will persist.

ELK

Elk sightings have continued to increase since the state of Idaho initiated a transplant program into the BLM monument near Cream Can Junction and the Bear Trap Cave. Elk observations during 2008 occurred over 25 miles south of the release point. Although knowledge of elk numbers or density is unknown, elk now occur at least sporadically over most of the monument and preserve during at least part of the year. With the exception of work in the Pioneer Mountains little is known about elk wintering at CRMO as well. During the later 1980s and early 1990s IDFG augmented elk herds in the area around Big Southern Butte. This was with the intent to rebuild the nearly extinct elk population on the Big Desert area. The elk season in the area was closed at that time and the general season remains closed as of 2008. The only open season during 2008 for the area of CRMO southeast of Highway 93 is an archery only season. The only general elk season in the Preserve is the area northwest of highway 93. It is unknown what level of hunting pressure exists in this area, but given the relatively small area and the difficult access, it expected to be light. With only limited hunting pressure in most of the preserve and surround area, elk herds are expected to continue increasing over the next few years.

Table 1. Summaries for 2004-2008 Craters of the Moon National Monument Mule Deer Survey.

SPRING	2004	2005	2006	2007	2008	15 year Average
Adult Doe	11	14	13	30	20	53
Yearlings	1	9	9	12	3	32
Yearling:100 Doe	*	*	*	*	*	60
Over-winter Survival	*	*	*	*	*	63%
Total Does	12	18.5	17.5	36	21.5	81
Adult Doe Ratio	96	76	74	83	93	74
FALL						
Mean # Adult Males	0.5	0.5	5.0	0.7	0.2	2.8
Percent change	213%	0%	1000%	-86.7%	-75%	
Mean # Yearling Male	1.7	0.3	0.3	0.8	0.2	2.8
Percent change	13%	-83%	0%	150%	-80%	
Mean # Adult Females	10.2	7.8	5.5	8.8	6.5	18.7
Percent change	7.3%	-23%	-29.8%	60.6%	-26%	
Mean # Fawns	6.0	5.2	4.3	6.7	5.8	17.5
Percent change	-34.8	-26%	-16.1%	53.8%	-13%	
MEAN TOTAL	18.4	13.8	15.2	17.2	13.3	41.4
Fawns:100 Does	59	66	79	75	90	92.8
Fawns:100 Adult Does	62	87	106	91	96	122
FALL POP'N ESTIMATES	155	120	130	144	116	315
95% CI	106-204	64-176	115-145	118-170	71-161	

* The sample sizes were too small to calculate valid estimates for these parameters. The 15 year average excludes these numbers.

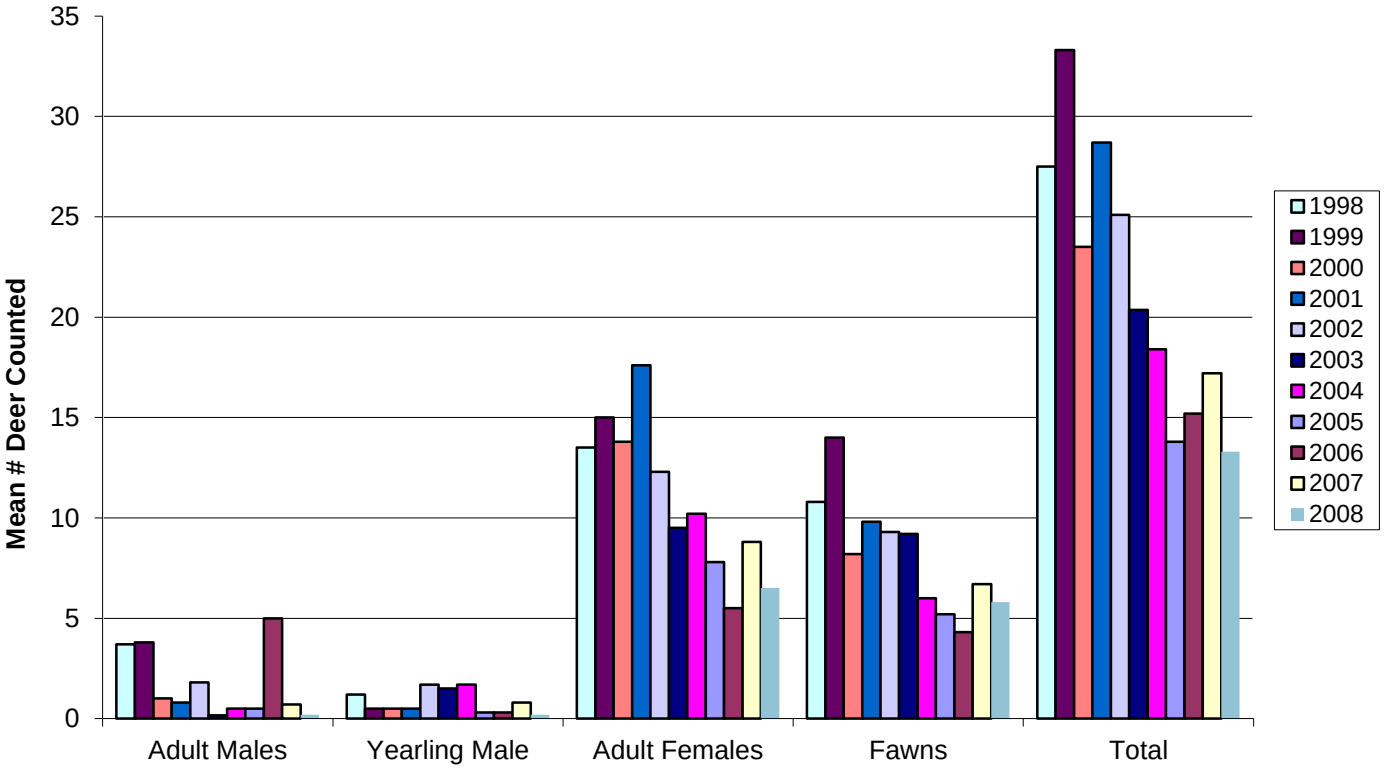


Figure 1. Mean number of mule deer counted be sex/age class in fall surveys 1998-2008.

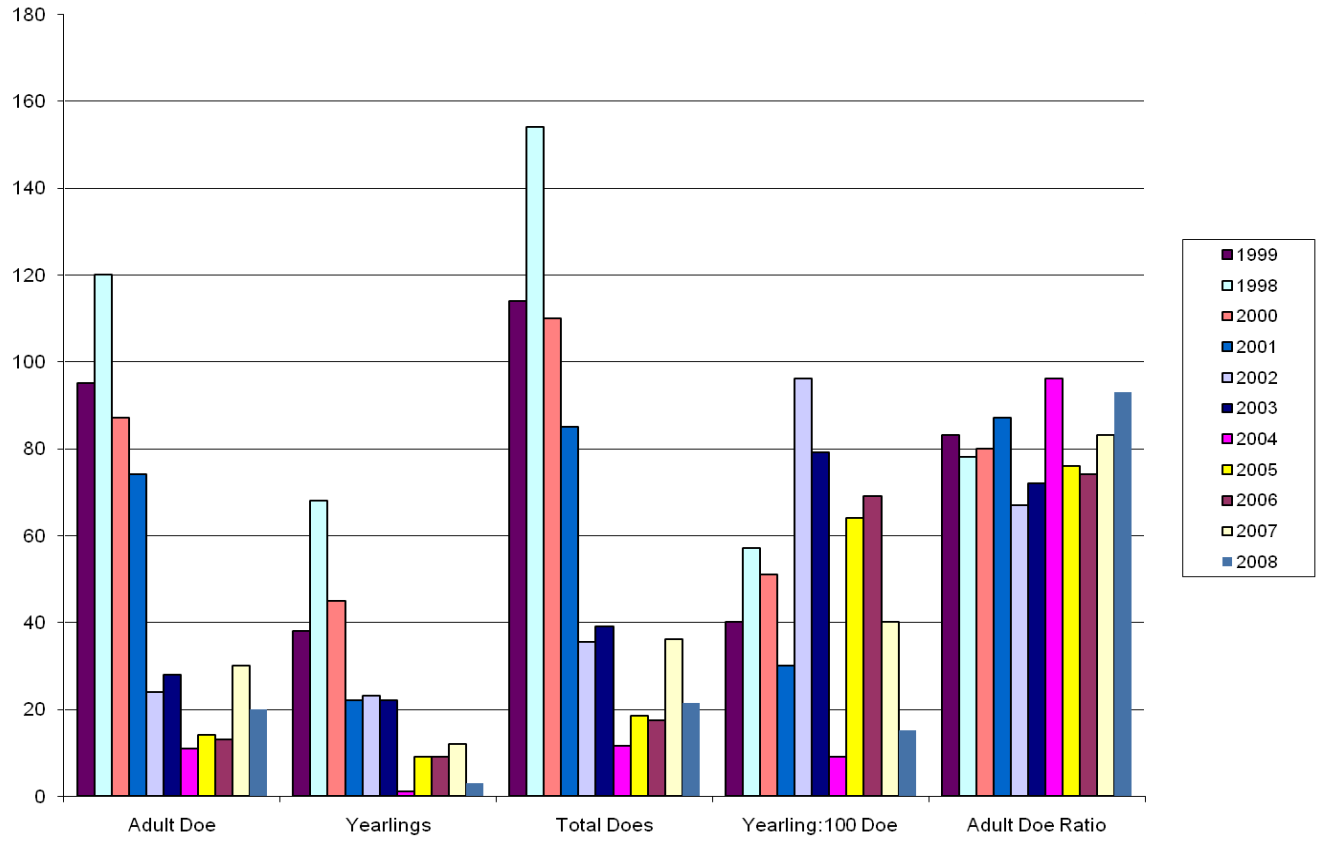


Figure 2. Number of deer counted in spring surveys 1998-2008.

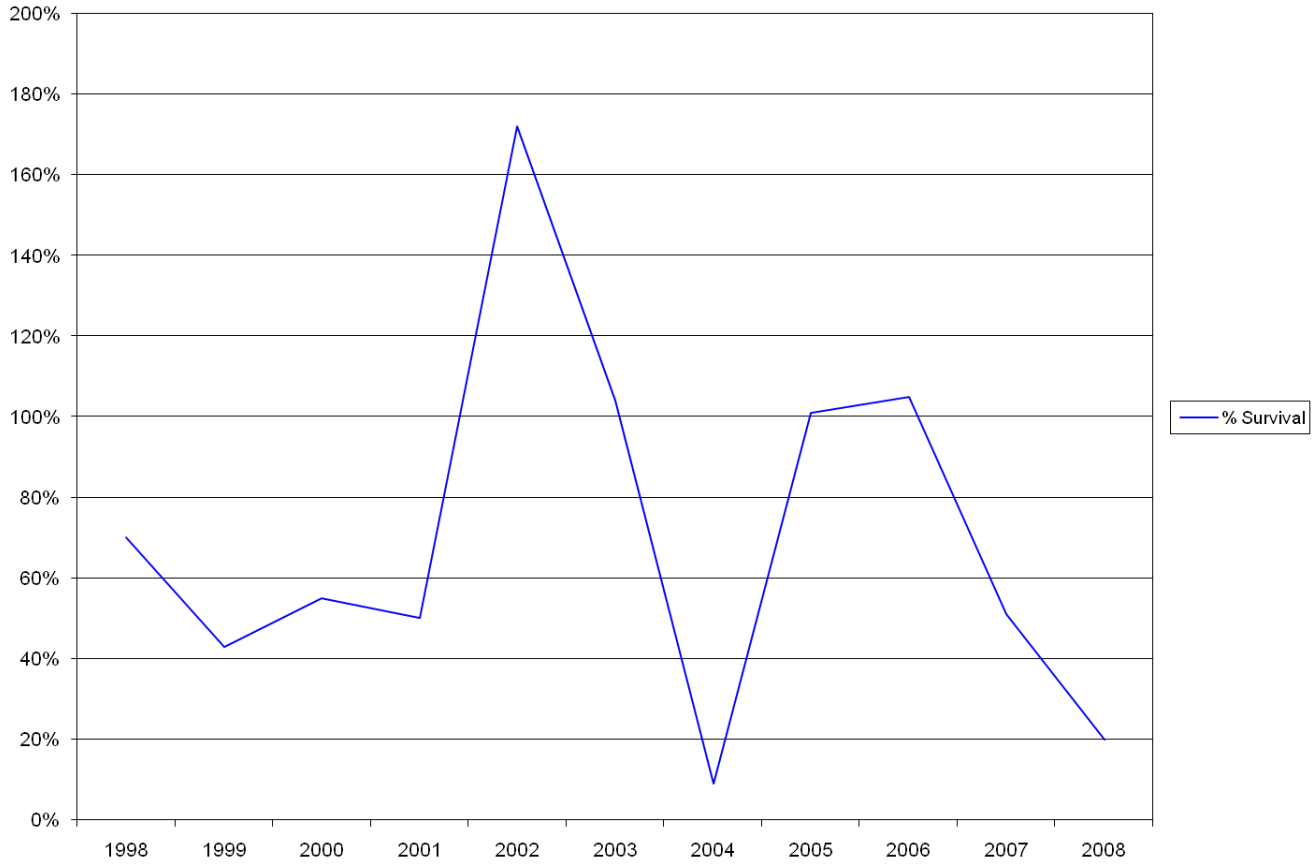


Figure 3. Calculated Percent over winter survival of fawns 1998-2008.

Values after 2002 have very small sample size and the calculations are suspect to extreme variation in the counts

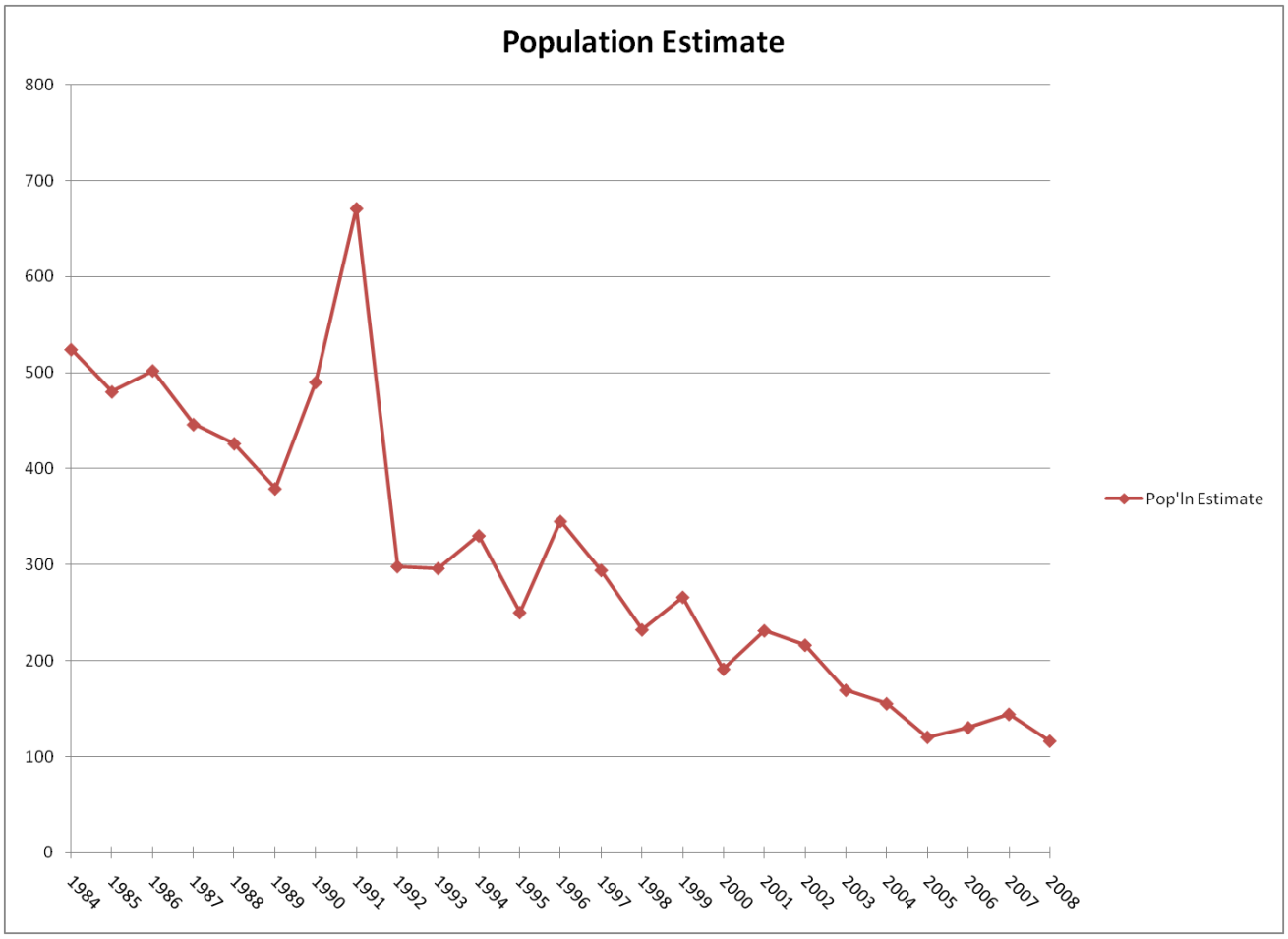


Figure 4. Annual Population Estimates for the Craters of the Moon mule deer herd 1987-2008.

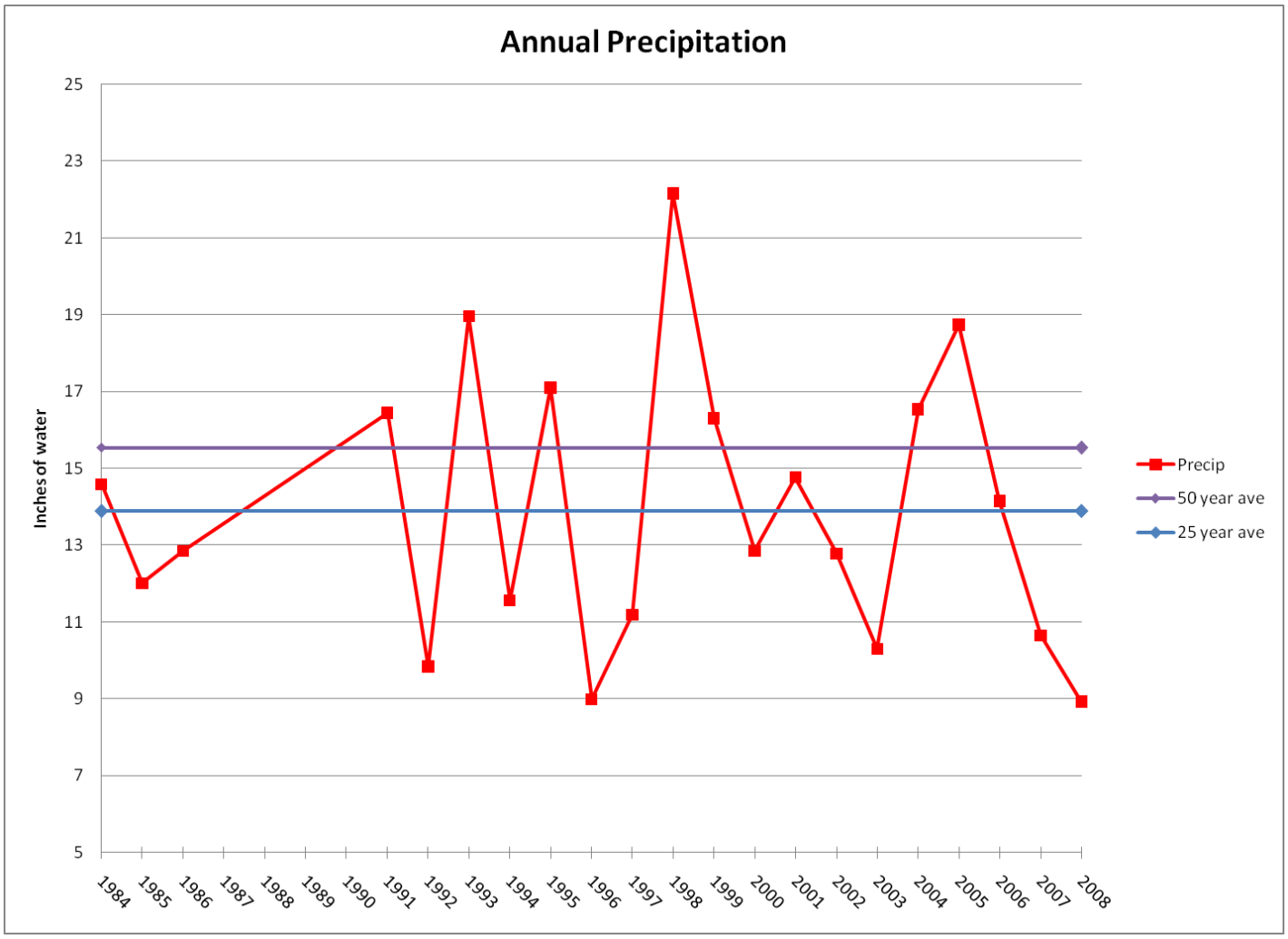


Figure 5. Annual precipitation with 25 and 50 year averages for duration of deer surveys 1984-2008.

Table 2. Daily survey totals, mean totals, and standard error figures for each class (age/sex) of deer in the 2008 Craters of the Moon National Monument Mule Deer Fall Survey.

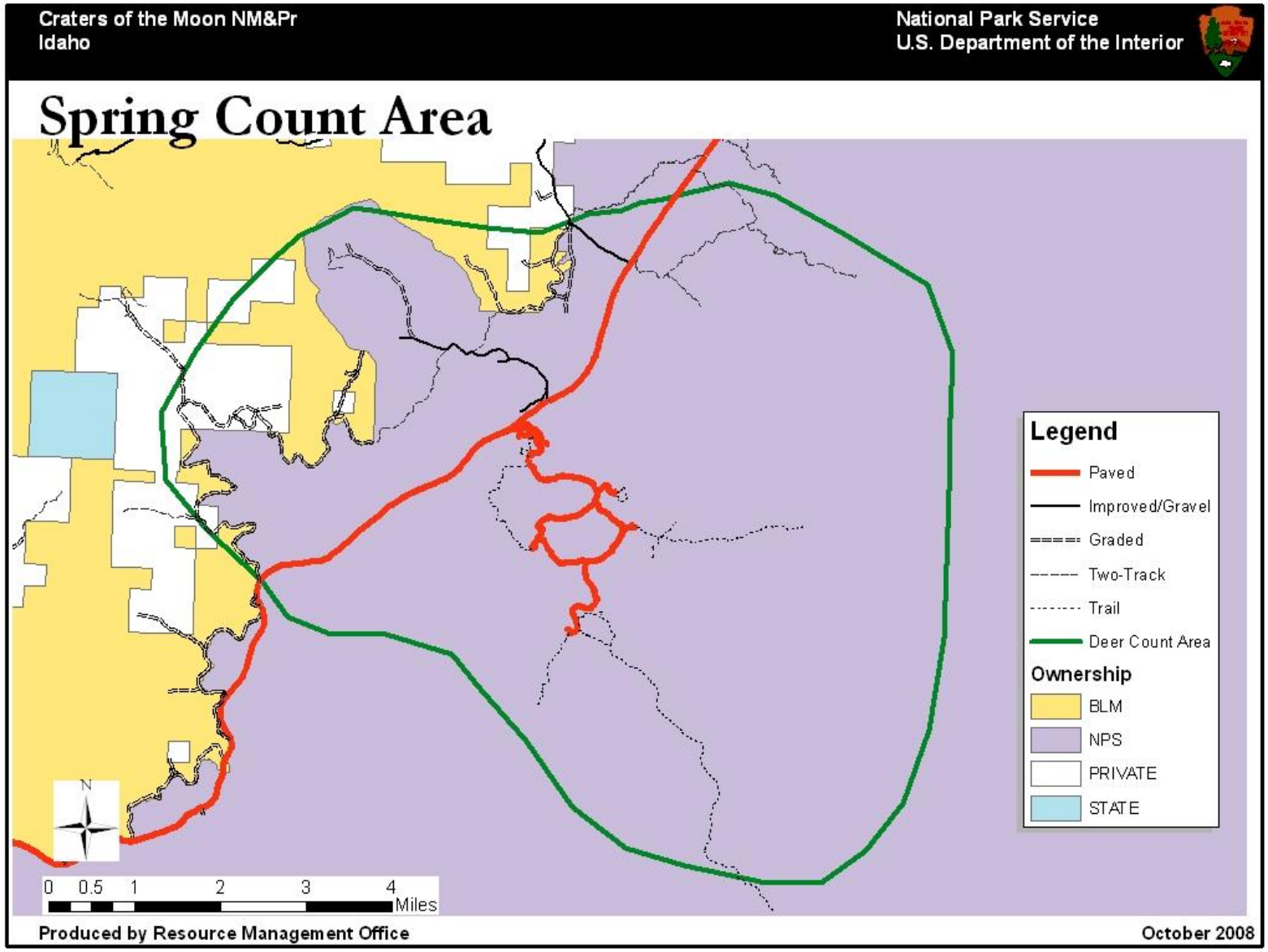
		1st	2nd	3rd	4th	5th	6th	total	mean	SE	t-test P
Ault males	#	**0.0**	**0.0**	**0.0**	**1.0**	**0.0**	**0.0**	1.0	0.2	0.2	0.092
	ratio	0.0	0.0	0.0	1.0	0.0	0.0		0.2		
Yrlg males	#	**0.0**	**0.0**	**0.0**	**1.0**	**0.0**	**0.0**	1.0	0.2	0.2	0.156
	ratio	0.0	0.0	0.0	1.0	0.0	0.0		0.2		
Females	#	**4.0**	**10.0**	**8.0**	**1.0**	**4.0**	**12.0**	39.0	6.5	1.7	0.286
	ratio	100.0	100.0	100.0	100.0	100.0	100.0		100.0		
Fawns	#	**4.0**	**12.0**	**4.0**	**1.0**	**2.0**	**12.0**	35.0	5.8	2.0	0.712
	ratio	100.0	120.0	50.0	100.0	50.0	100.0		86.7		
Unknown		**1.0**	**0.0**	**0.0**	**2.0**	**1.0**	**0.0**	4.0	0.7		
Total		9.0	22.0	12.0	6.0	7.0	24.0	80.0	13.3	3.2	0.321

Significant change is the P value from a student t-test between means for 2008 and 2007 counts
ratio = the age/sex class to adult doe ratio for a survey

Table 3. Craters of the Moon National Monument Mule Deer Survey Summaries in 3 year intervals for the period 1984-2007.

	1984-86	1987-89	1990-92	1993-95	1996-98	1999-2001	2002-2004	2005-2007
SPRING								
Adult Doe	71	59	47	48	71	85	21	19
Yearling	62	40	41	16	38	35	18	10
Yearling:100 Doe	71	65	85	44	51	40	*	*
Over-winter Survival	68%	66%	79%	55%	56%	49%	*	*
Total Does	120	80	67	56	90	103	29	24
Adult Doe Ratio	0.74	0.76	0.71	0.82	0.80	0.83	0.78	0.77
FALL								
Mean # Adult Males	2.4	3.2	5.6	3.4	3.8	1.9	0.8	2.1
Percent Change		33%	75%	-39%	12%	-50%	-58%	162%
Mean # Yearling Males	4.8	4.0	2.4	1.2	2.2	0.5	1.6	0.5
Percent Change		-17%	-40%	-50%	83%	-77%	220%	-68%
Mean # Adult Females	29	27	27	12	16	12.1	10.6	7.4
Percent Change		-7%	0%	-55%	27%	-25%	-12.4%	-30%
Mean # Fawns	30	22	29	12	14	10.6	8.1	5.4
Percent Change		-26%	32%	-60%	17%	-24%	-23.6%	-33%
MEAN TOTAL	66	55	64	28	37	28.5	21.3	15.4
Fawns:100 Does	106	93	105	96	92	69	77	78
Fawns:100 Adult Does	144	123	170	116	115	90	103	95
FALL POPULATION ESTIMATES	502	417	486	228	290	179	180	131

* Statistic not calculated due to very small sample size in all three years.


Craters of the Moon NM&Pr
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U.S. Department of the Interior
Spring Count Area
Legend
Paved
Improved/Gravel
Graded
Two-Track
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Deer Count Area
Ownership
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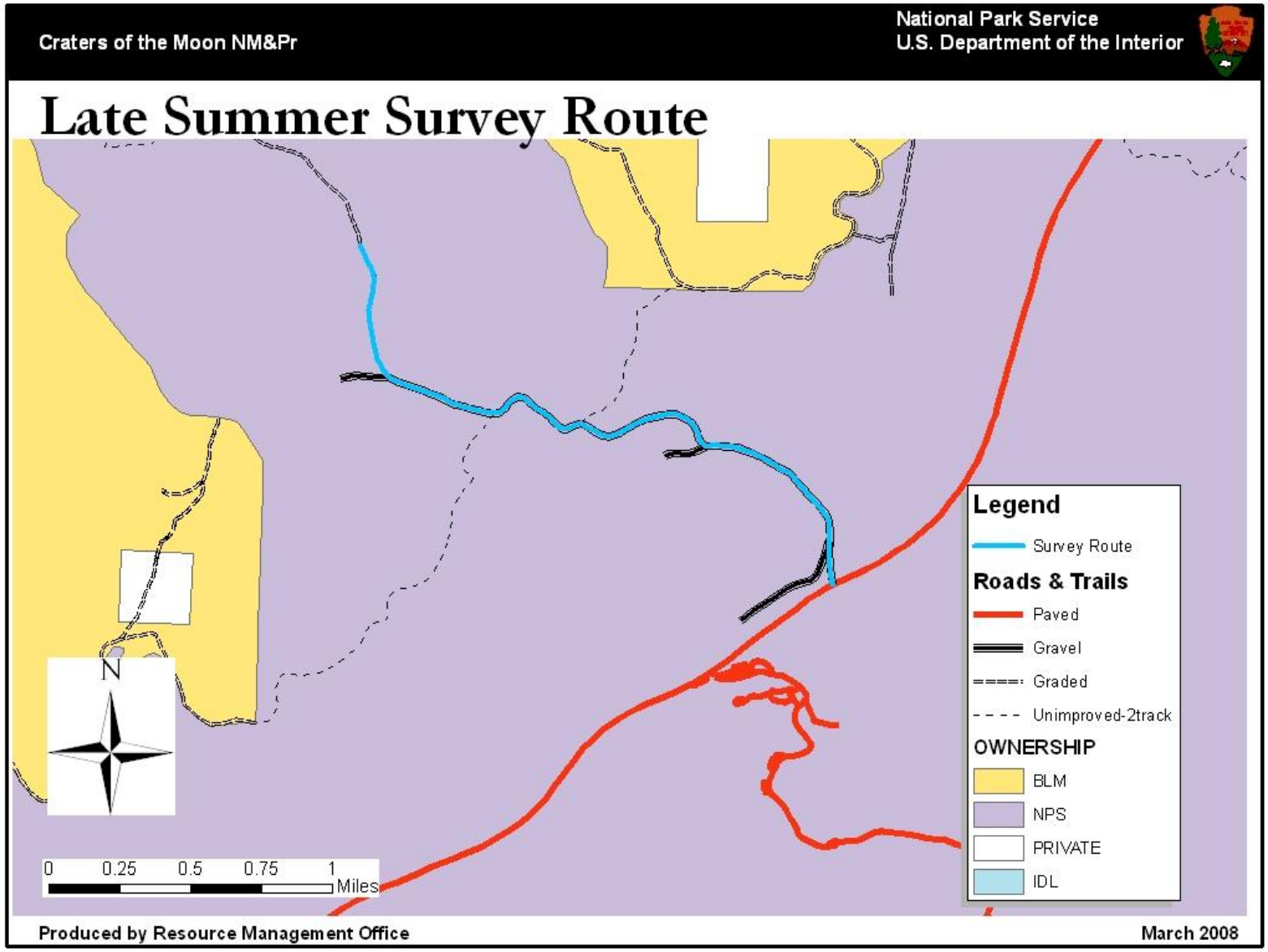
Craters of the Moon NM&Pr
National Park Service
U.S. Department of the Interior
Late Summer Survey Route
Legend
Survey Route
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Paved
Gravel
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Unimproved-2track
OWNERSHIP
BLM
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